

Remarks/Arguments

Applicant respectfully requests further examination and reconsideration in view of the above amendments and arguments set forth fully below. Claims 1-105 were previously pending in the instant application. Within the Office Action, Claims 1-9, 11-40, 42-53, 55-59, 61-64, 66-77, 95-98, 102, 104 and 105 stand rejected and Claims 10, 41, 54, 60, 65, 78-94, 99-101 and 103 are objected to. By way of the above amendments, Claims 1, 33, 61, 64 and 66-68 are amended and Claims 63, 65 and 105 are withdrawn. Accordingly, Claims 1-105 are now pending in this application.

Rejections under 35 U.S.C. §102

Within the Office Action, Claims 1-9, 11-22, 24-32, 33-40, 52, 53, 55, 56, 59, 61-64, 66-68 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,388,635 to Gruber et al. (Hereafter "Gruber"). Specifically, within the Office Action it is stated that Gruber discloses a heat exchanger and method of cooling a heat source comprising all of the applicant's claimed and disclosed limitations of the instant invention. The Applicant respectfully traverses this rejection for the following reasons.

Gruber teaches a cooling hat, where heat is removed from a heat source through conduction and a coolant fluid. Heat from heat generating components is conducted away from the source, through a thermal joint and to a coldsheet. Coolant fluid flows from above through a main supply port, into many supply ducts and through a capillary sheet. A reservoir for fluid is created at the cold sheet. The fluid carries heat from the coldsheet out through return ducts and an return port.

As one example of the teachings of Gruber, consider Figures 6 and 7 and its associated text at Column 9, Line 50 through Column 11, Line 29. Fluid enters a reservoir region (not numbered, but containing the reference numerals 34, 28, 56 and 58) from a source input 30 via supply capillaries 34. The fluid exits the reservoir via the return capillaries 38. The grooves 58 and fins 56 are at the opposite side of the reservoir. The fluid flow will be substantially directly from the supply capillaries 38. To the extent that any flow traverses the grooves 58 and the fins 56, that flow will be secondary. More over, no flow is forced through the grooves 58. This in Gruber, the fluid passes over and adjacent to the interface layer and not through the interface layer.

In sharp contrast to the teaching of Gruber, the present invention teaches a heat exchanger that directly cools a heat source, by directing the fluid through the interface layer. The heat exchanger comprises an interface layer that is in direct contact with a heat source and a manifold layer that helps to supply and direct the fluid flow in and out of the heat exchanger. Fluid flows from the manifold directly to the interface layer. The fluid is directed to the heat source. The present invention allows for control over where the fluid is to flow, rather than creating a reservoir for the fluid. Gruber fails to teach of directing the fluid flow through the interface layer as recited in Independent Claims 1 and 33.

Specifically, the independent Claim 1 is directed to a heat exchanger. The heat exchanger comprises an interface layer in contact with a heat source and configured to pass fluid therethrough, and a manifold layer coupled to the interface layer, the manifold layer further comprising a first set of individualized fluid paths for channeling fluid to the interface layer, the individual fluid paths in the first set positioned to minimize pressure drop within the heat exchanger. As described above, Gruber fails to teach of directing the fluid through the interface layer to directly cool the heat source. For at least this reason, the amended Independent Claim 1 is allowable over the teachings of Gruber.

Claims 2-9, 11-22, and 24-32 are dependent on the independent Claim 1. As described above, the independent Claim 1 is allowable over the teachings of Gruber. Accordingly Claims 2-9, 11-22, and 24-32 are also allowable as being dependent on an allowable base claim.

The independent Claim 33 is directed to a heat exchanger configured to cool a heat source. The heat exchanger comprises an interface layer in contact with the heat source and configured to pass fluid therethrough, and a manifold layer coupled to the interface layer, the manifold layer further comprising a first level having a plurality of substantially vertical inlet paths for delivering fluid to the interface layer wherein the inlet paths are arranged an optimal fluid travel distance from one another and a second level having at least one outlet path for removing fluid from the interface layer. As described above, Gruber fails to teach of directing the fluid through the interface layer to directly cool the heat source. For at least this reason, the amended Independent Claim 33 is allowable over the teachings of Gruber.

Claims 34-40, 42-50, 52, 53, 55, 56 and 59 are dependent on the Independent Claim 33. As described above, the Independent Claim 33 is allowable over the teachings of Gruber. Accordingly Claims 34-40, 42-50, 52, 53, 55, 56 and 59 are also allowable as being dependent on an allowable base claim.

Independent Claim 61 was amended to include the allowable subject matter of Claim 65 and the corresponding base Claim 63. Accordingly, Claims 62, 64 and 66-68 are allowable as being dependent on an allowable base claim.

Within the Office Action, Claim 104 was rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,239,443 to Fahey et al. (Hereafter "Fahey"). Specifically, within the Office Action it is stated that Fahey discloses a heat exchanger and method of cooling a heat source comprising all of the applicant's claims and disclosed limitations of the instant invention. The Applicant respectfully traverses this rejection for the following reasons.

Fahey teaches a blind hole cold plate cooling system. The system comprises a manifold for transferring fluid, and a plate for heat transfer. The manifold sends fluid to cavities in the plate. Heat from the heat producing device flows into the plate, is transferred to the fluid and exits the manifold. The plate is kept in removable contact with the heat producing device.

In contrast to the teachings of Fahey, the Independent Claim 104 teaches an electronic device which produces heat. The device comprises an integrated circuit, an interface layer for cooling heat produced by the electronic device, the interface layer integrally formed with the integrated circuit and configured to pass fluid therethrough and a manifold layer for circulating fluid with the interface layer, the manifold layer having at least one inlet fluid path for delivering fluid to the interface layer and at least one outlet fluid path for removing fluid from the interface layer, the at least one inlet fluid path and the at least one outlet fluid path arranged to provide an optimal minimum fluid travel distance apart from each other. Fahey fails to teach or suggest of forming the interface layer, manifold layer and heat source as one piece. For at least this reason, the independent Claim 104 is allowable over the teachings of Fahey.

Within the Office Action, Claims 69-76 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,431,260 to Agonafer et al. (Hereafter "Agonafer"). Specifically, within the Office Action it is stated that Agonafer discloses a heat exchanger and method of cooling a heat source comprising all of the applicant's claims and disclosed limitations of the instant invention.

Agonafer teaches a cooling assembly and a method of manufacturing said cooling assembly. The cooling assembly comprises a cavity plate and jet nozzles that deliver fluid into the cavities. Heat from a heat producing device flows through the cavity plate and meets the fluid flowing in the cavities. The fluid is then carried out of the system.

In contrast to the teachings of Agonafer, the Independent Claim 69 teaches a method of manufacturing a heat exchanger configured to cool a heat source. The heat exchanger comprises the steps of forming an interface layer and a manifold layer. The interface layer and the manifold layer are coupled to one another. Fluid from the manifold layer flows to the interface layer through apertures. Fluid in the interface layer is able to meet the contact surface to the heat source. Agonafer fails to teach of a manifold layer in contact with an interface layer. Agonafer also fails to teach of having the fluid flow to meet the heat source. For at least these reasons, the independent Claim 69 is allowable over the teachings of Agonafer.

Claims 70-76 are dependent on the independent Claim 69. As described above, the independent Claim 69 is allowable over the teachings of Agonafer. Accordingly Claims 70-76 are also allowable as being dependent on an allowable base claim.

Rejections under 35 U.S.C. §103

Within the Office Action, Claims 23 and 51 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gruber in view of U.S. Patent No. 6,729,383 to Cannel et al. (Hereafter "Cannel").

Claim 23 is dependent on the independent Claim 1. As described above, the independent Claim 1 is allowable over the teachings of Gruber. Accordingly, Claim 23 is also allowable as being dependent on an allowable base claim.

Claim 51 is dependent on the independent Claim 33. As described above, the independent Claim 33 is allowable over the teachings of Gruber. Accordingly, Claim 51 is also allowable as being dependent on an allowable base claim.

Within the Office Action, Claims 57 and 58 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gruber in view of Cannel and further in view of U.S. Patent No. 3,948,316 to Souriau (Hereafter "Souriau").

Claims 57 and 58 are dependent on the independent Claim 33. As described above, the independent Claim 33 is allowable over the teachings of Gruber. Accordingly, Claims 57 and 58 are also allowable as being dependent on an allowable base claim.

Within the Office Action, Claims 77, 92, 95-98, 102 and 103 were rejected under 35 U.S.C. 103(a) as being unpatentable over Agonafer in view of Gruber.

Claims 77, 92, 95-98, 102 and 103 are dependent on the independent Claim 69. As described above, the independent Claim 69 is allowable over the teachings of Agonafer. Accordingly, Claims 77, 92, 95-98, 102 and 103 are also allowable as being dependent on an allowable base claim.

Allowable Subject Matter

Within the Office Action, Claims 10, 41, 54, 60, 65, 78-94, 99-101 and 103 were objected to as being dependent on a rejected base Claim.

Claim 10 is dependent on the independent Claim 1. As described above, amended Claim 1 is allowable over the teachings of Gruber. Accordingly, Claim 10 is allowable as being dependent on an allowable base claim.

Claims 41, 54 and 60 are dependent on the independent Claim 33. As described above, amended Claim 33 is allowable over the teachings of Gruber. Accordingly, Claims 41, 54 and 60 are allowable as being dependent on an allowable base claim.

Claim 65 is dependent on the independent Claim 61. As described above, Claim 61 was amended to include the allowable subject matter of Claim 65 and the corresponding base Claim 63. Also, as stated above, Claims 62, 64 and 66-68 are accordingly allowable as being dependent on an allowable base claim.

Claims 78-94, 99-101 and 103 are dependent on the independent Claim 69. As described above, amended Claim 69 is allowable over the teachings of Agonafer. Accordingly, Claims 78-94, 99-101 and 103 are allowable as being dependent on an allowable base claim.

If the Examiner has any questions or comments, the Examiner is encouraged to call the undersigned at (408) 530-9700 to discuss them so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR § 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450

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